X3M-D
FLASH-D

Energy data manager
&
Electric Energy Analyzer

Installation Manual

Unless specifically itemized, this instructions manual is common to both the instruments type X3M-D and Flash-D.

Version 5 dated June 20th 2005 (PRELIMINARY VERSION)
The document can be modified without prior information.

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INTRODUCTION

We thank you for choosing an Electrex instrument
We invite you to carefully read this instructions manual for the best use of the **X3M D** and **Flash D** instruments.

1.1 COPYRIGHT

Electrex S.r.l. All rights are reserved.
It is forbidden to duplicate, adapt, transcript this document without Electrex written authorization, except when regulated accordingly by the Copyright Laws.
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1.2 WARRANTY

This product is covered by a warranty against material and manufacturing defects for a period of 36 months period from the manufacturing date
The warranty does not cover the defects that are due to:
• Negligent and improper use
• Failures caused by atmospheric hazards
• Acts of vandalism
• Wear out of materials
Electrex reserves the right, at its discretion, to repair or substitute the faulty products
The warranty is not applicable to the products that will result defective in consequence of a negligent and improper use or an operating procedure not contemplated in this manual.

1.3 RETURN AND REPAIR FORMALITIES

Electrex accepts the return of instruments for repair **only** when authorized in advance. For instrument purchased directly, the repair authorization must be requested to Electrex directly by using the enclosed RMA form. We recommend otherwise to contact your local distributor for assistance on the return/repair formalities. In both the cases, the following information must be supplied:

- Company full data
- Contact name for further communication
- Product description
- Serial number
- Description of the returned accessories
- Invoice / Shipping document number and date
- Detailed description of the fault and of the operating condition when the fault occurred

The Electrex repair lab will send the authorization number to the customer directly or to the distributor as per applicable case.
The RMA authorization number shall be clearly marked on the packaging and on the return transport document.
WARNING: *Failure to indicate the RMA number on the external packaging will entitle our warehouse to refuse the delivery upon arrival and to return the parcel at sender's charge.*

The material must be shipped:

- within 15 working days from the receipt of the return authorization number
- free destination i.e. all transport expenses at sender's charge.
- to the following address: **Electrex S.r.l.**
  Via Claudia 96 - 41056 Savignano s/P (MO) - Italy
  Atn. Repair laboratory
- the units covered by warranty must be returned in their **original packaging**.

1.3.1 RE-SHIPPING OF REPAIRED PRODUCT

The terms for re-shipment of repaired products are ex-works, i.e. the transport costs are at customer charge. Products returned as detective but found to be perfectly working by our laboratories, will be charged a fixed fee (40.00 Euro + VAT where applicable) to account for checking and testing time irrespective of the warranty terms.

1.3.2 Return Material Authorization (RMA form)

Request for the authorization number for the return of goods

Date:	
Company:	
Contact name:	
TEL:	FAX:
Product description:	
Serial number:	
Description of the returned accessories (if any):	
Original purchase Invoice (or Shipping document) number and date. NB: The proof of purchase must be provided by the customer. Failure to complete this area will automatically void all warranty.	
Detailed description of the malfunction and of the operating conditions when the fault occurred	
☐ Tick off for a quotation	
Should a product be found by our laboratories to be perfectly working, a fixed amount of **40 Euro** (+VAT if applicable) will be charged to account for checking and testing time irrespective of the warranty tems.	

Space reserved to ELECTREX

R.M.A. No.

The RMA number shall be clearly indicated on the external packaging and on the shipping document:. Failure to observe this requirement will entitle the ELECTREX warehouse to refuse the delivery.

2 Safety

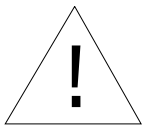
This instrument was manufactured and tested in compliance with IEC 1010 class 2 standards and in accordance with VDE 0110 group B insulation standards for operating voltages up to 250 VAC rms phase to neutral.
In order to maintain this condition and to ensure safe operation, the user must comply with the indications and markings contained in the following instructions:

- When the instrument is received, before starting its installation, check that it is intact and no damage occurred during transport.
- Before mounting, ensure that the instrument operating voltages and the mains voltage are compatible then proceed with the installation.
- The instrument power supply needs no earth connection.
- The instrument is not equipped with a power supply fuse; a suitable external protection fuse must be foreseen by the contractor.
- Maintenance and/or repair must be carried out only by qualified, authorized personnel
- If there is ever the suspicion that safe operation is no longer possible, the instrument must be taken out of service and precautions taken against its accidental use.
- Operation is no longer safe when:
  1) There is clearly visible damage.
  2) The instrument no longer functions.
  3) After lengthy storage in unfavorable conditions.
  4) After serious damage occurred during transport

The instruments X3M-D and Flash-D must be installed in respect of all the local regulations.

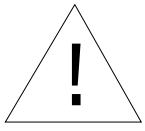
2.1 Operator safety

Warning: Failure to observe the following instructions may lead to a serious danger of death.



- During normal operation dangerous voltages can occur on instrument terminals and on voltage and current transformers. Energized voltage and current transformers may generate lethal voltages. Follow carefully the standard safety precautions while carrying out any installation or service operation.
- The terminals of the instrument **must** not be accessible by the user after the installation. The user should only be allowed to access the instrument front panel where the display is located.
- Do not use the digital outputs for protection functions nor for power limitation functions. The instrument is suitable only for secondary protection functions.
- The instrument must be protected by a breaking device capable of interrupting both the power supply and the measurement terminals. It must be easily reachable by the operator and well identified as instrument cut-off device.
- The instrument and its connections must be carefully protected against short-circuit.

Precautions: Failure to respect the following instructions may irreversibly damage to the instrument.

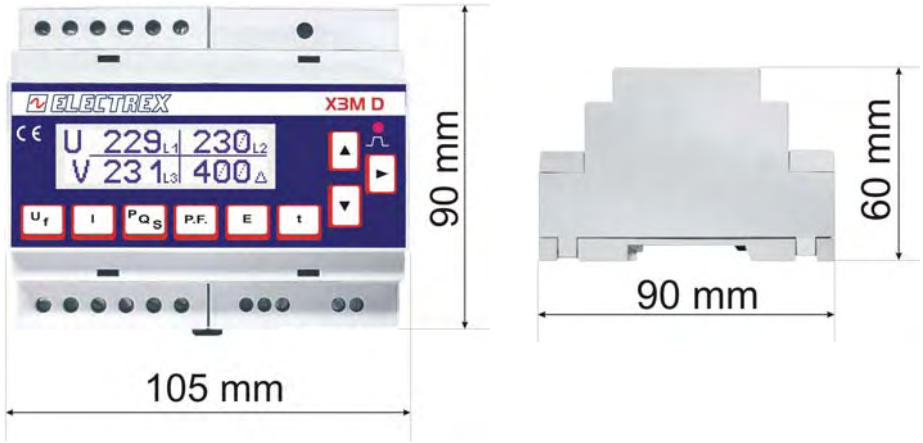


- The instrument is equipped with PTC current limiting device but a suitable external protection fuse should be foreseen by the contractor.
- The outputs and the options operate at low voltage level; they cannot be powered by any unspecified external voltage.
- The application of currents not compatible with the current inputs levels will damage to the instrument.

3 Mounting

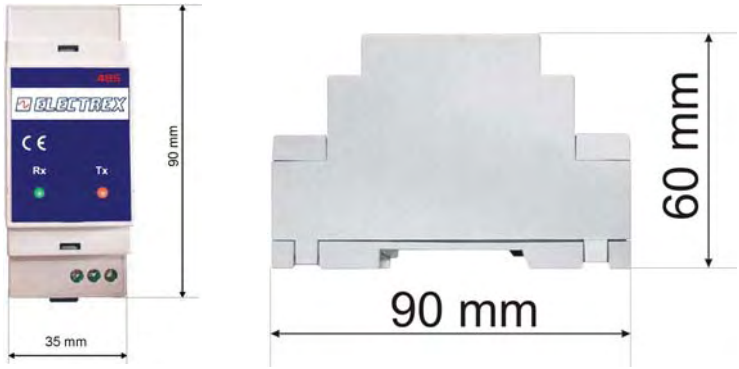
3.1 Instruments size (mm)

6 DIN rail modules



3.2 Optional modules size (mm)

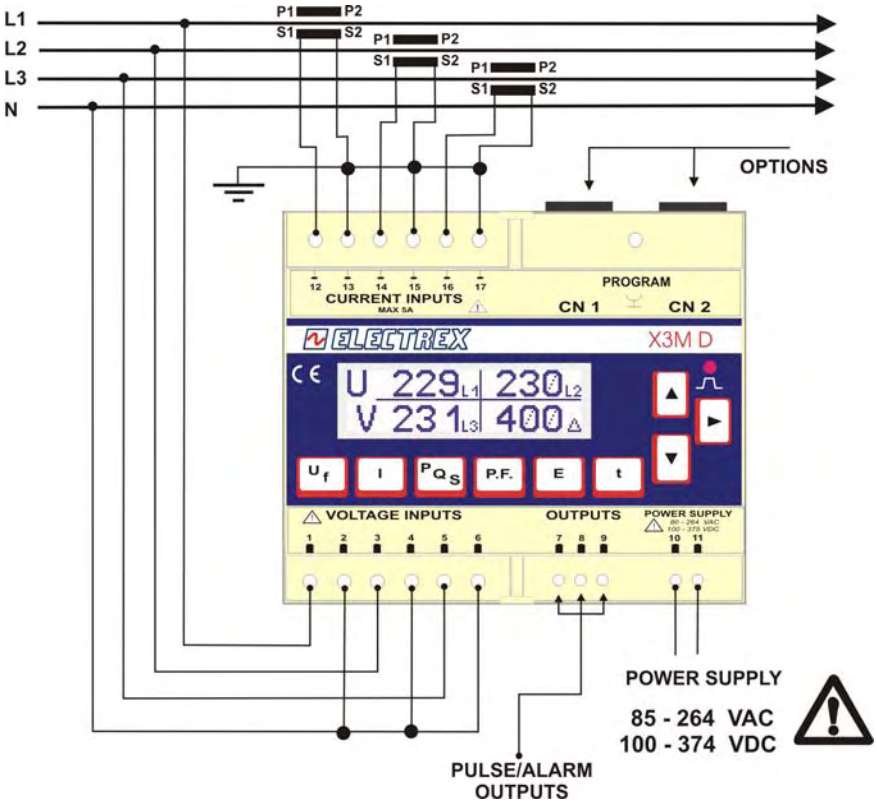
2 DIN rail modules.



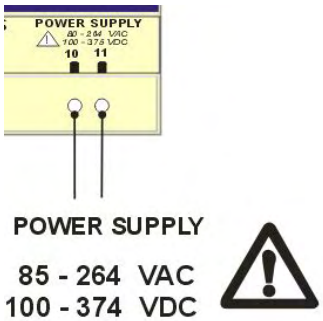
3.3 Fixing and blocking

The instrument (as well as the optional modules) are fixed to the DIN rail by means of the spring clip located on the rear side of the unit

4 Wiring diagrams



4.1 Power supply



The instrument is fitted with a separate power supply with extended operating range. The power supply terminals are numbered (10) and (11).
Use cables with max cross-section of 2,5 mm^2.

4.2 Measurement connections

4.2.1 Voltage connection

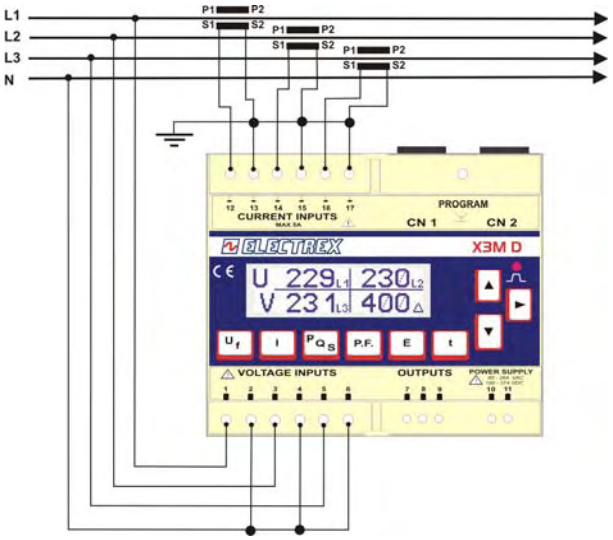
Use cables with max cross-section of 2,5 mm^2 and connect them to the terminals marked VOLTAGE INPUT on the instrument according to the applicable diagrams that follow.

4.2.2 Current connection

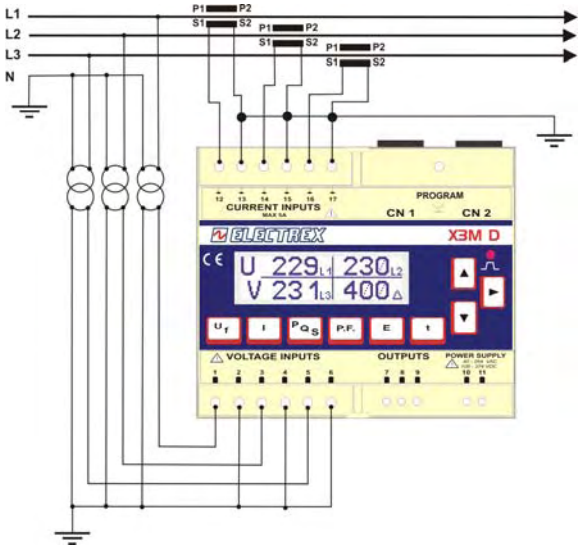
It is necessary to use external CTs with a primary rating adequate to the load to be metered and with a 5A secondary rating. The number of CTs to be used (1, 2 or 3) depends upon the type of network.
Connect the CT output(s) to the terminals marked CURRENT INPUT of the instrument according to the applicable diagrams that follow.
Use cables with cross-section adequate to the VA rating of the CT and to the distance to be covered. The max cross-section for the terminals is 2,5 mm^2.
N.B. The CT secondary must always be in short circuit when not connected to the instrument in order to avoid damages and risks for the operator.

Warning: THE PHASE RELATIONSHIP AMONG VOLTAGE AND CURRENT SIGNALS MUST BE CAREFULLY RESPECTED. ALL DISREGARD OF THIS RULE OR OF THE WIRING DIAGRAM LEADS TO SEVERE MEASUREMENT ERRORS.

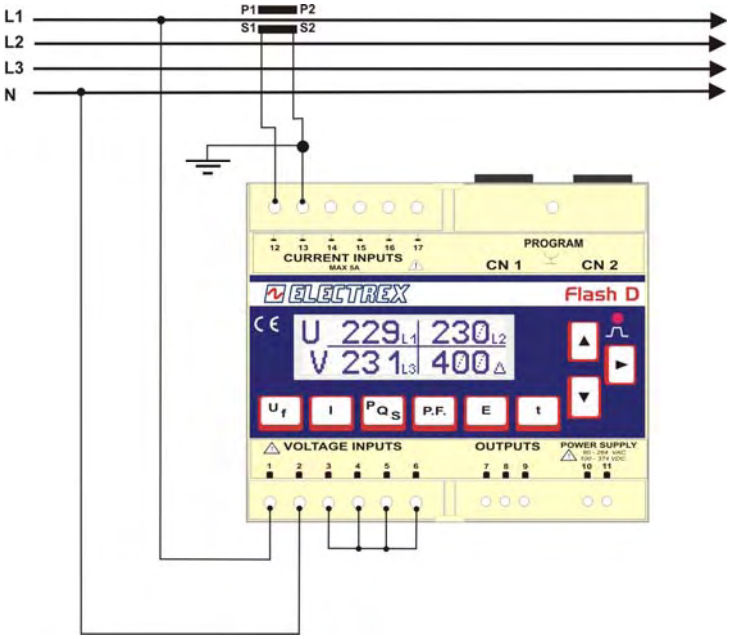
4.2.3 4W Star connection (4 wire)



Low voltage 3 CTs
Configuration 3P 4W



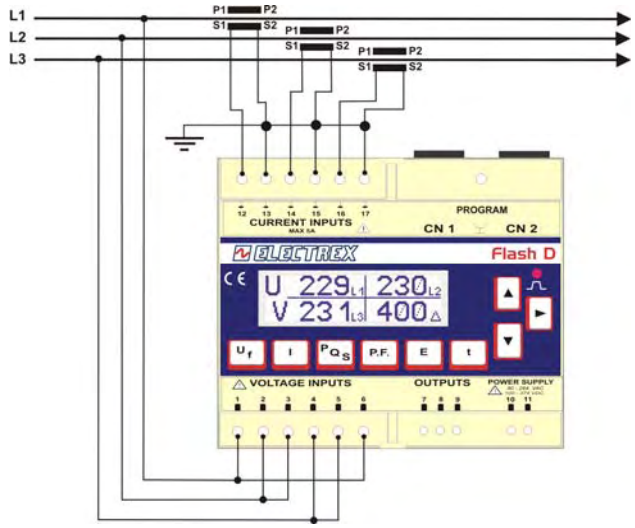
High voltage 3 PTs 3 CTs
Configuration 3P 4W



Low Voltage 1 CT (symmetrical and balanced load)
Configuration 3P-b 4W

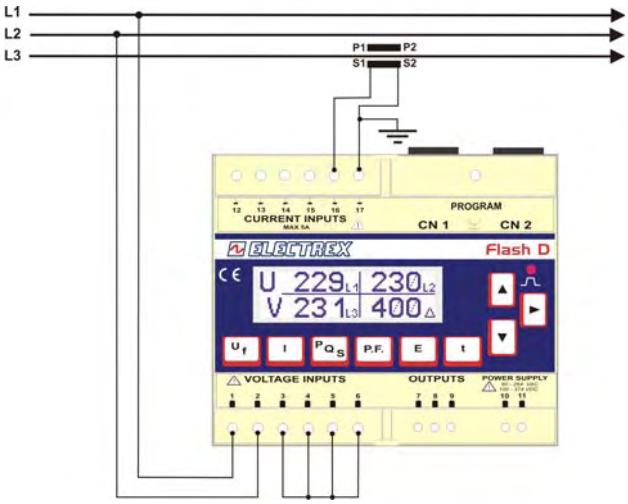
4.2.4 3W Delta connection (3 wire)

Connection with 3 CTs



Low Voltage 3 CTs (unbalanced load)
load)
Configuration 3P 3W

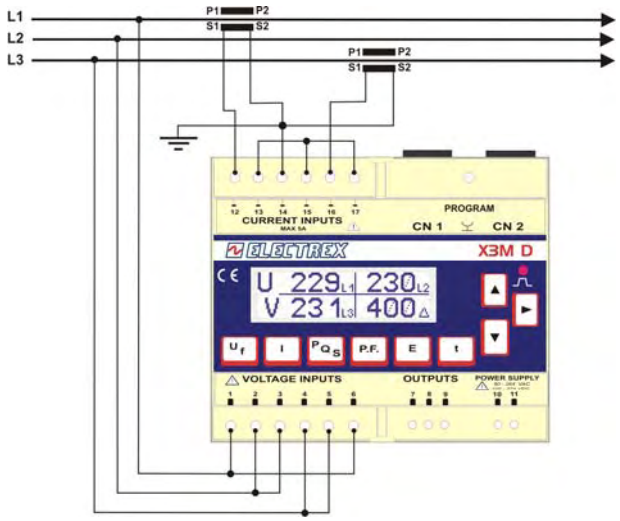
Connection with 1 CT



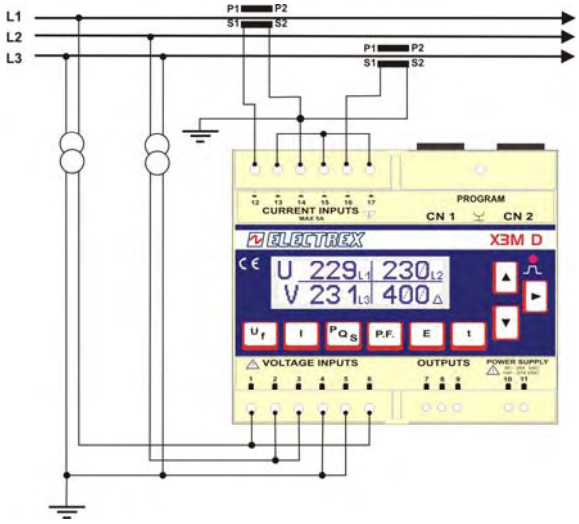
Low Voltage 1 CT (symmetrical and balanced load)

Configuration 3P-b 3W

4.2.4.1 Connection with 2 CTs on L1 and L3

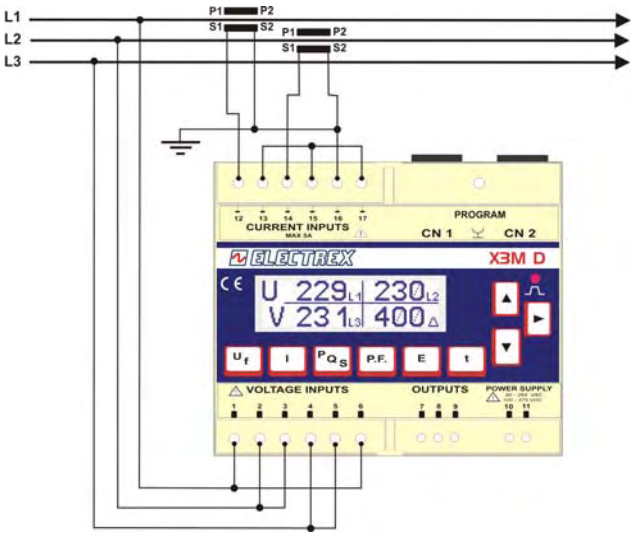


Low Voltage 2 CTs
Configuration 3P 3W

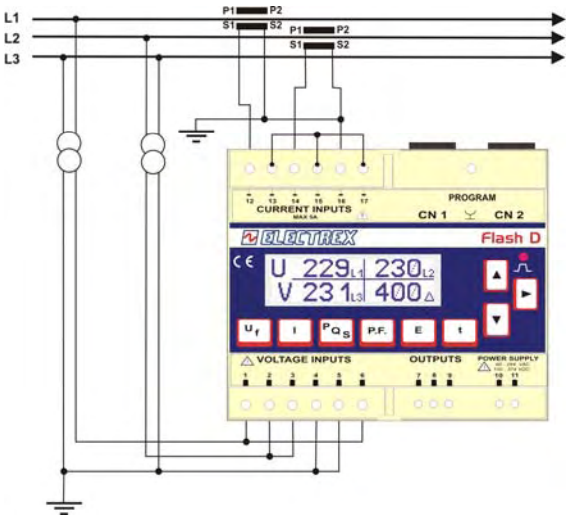


High Voltage 2 PTs 2 CTs
Configuration 3P 3W

4.2.4.2 Connection with 2 CTs on L1 and L2

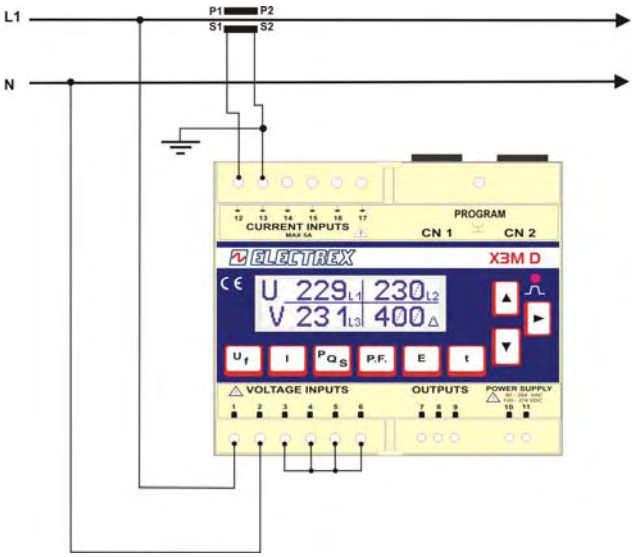


Low Voltage 2 CTs
Configuration 3P 3W



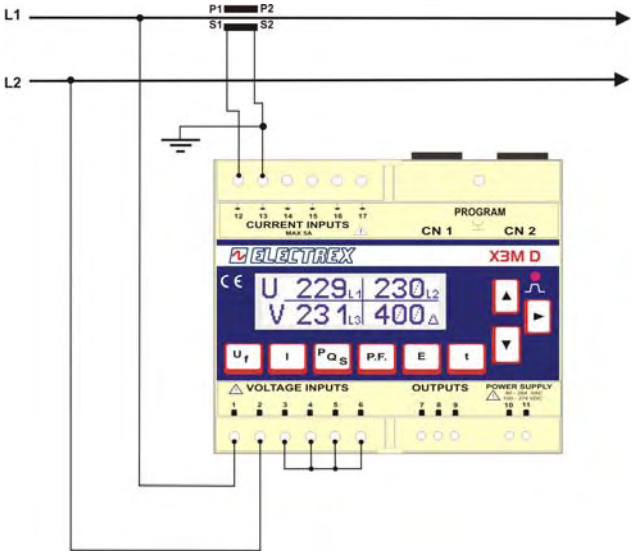
High Voltage 2 PTs 2 CTs
Configuration 3P 3W

4.2.5 2 Wire connection (single phase)



Low Voltage (phase-neutral) 1 CT
Configuration **1P 2W**

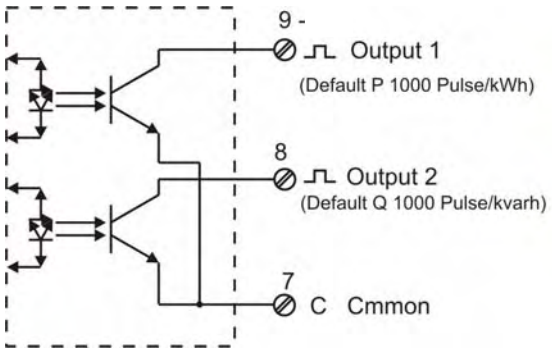
4.2.6 2 Wire connection (bi-phase)

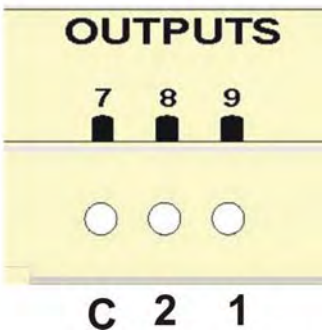


Low Voltage (phase-phase) 1 CT
Configuration **2P 2W**

4.3 Outputs connection

The instrument is equipped with two opto-isolated transistor outputs rated 27 Vdc, 27 mA (DIN 43864 standards).
The outputs working mode is set by default to operate as pulse output proportional to the Active energy (output 1) and to the Reactive energy (output 2). They support an output rate of 1.000 pulses per kWh (or kvarh) referred to the instrument input range without any CT and PT multiplier.





In order to calculate the energy value of each pulse the following formula must be considered.

$$K_P = \frac{K_{CT} \times K_{PT}}{Pulse / kWh}$$

Where: K_p = energy of each pulse; K_{CT} = CT ratio ; K_{PT} = PT ratio ;
Pulse/kWh = Pulse rate

Example: CT = 100/5; PT = 20.000/100 $K_P = \frac{20 \times 200}{1000} = 4 kWh / pulse$ or **kWh** = Pulse count / 4

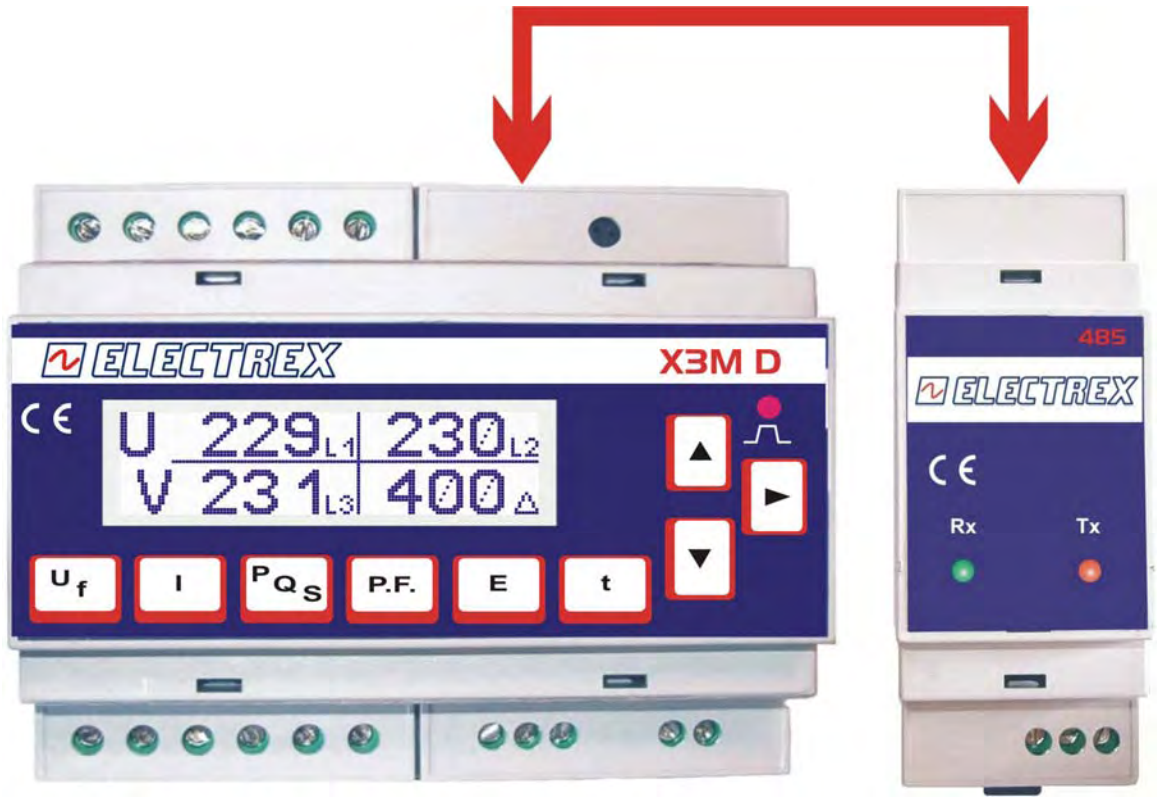
Other pulse rate settings may be however programmed as described in the instrument set up section.

The operating mode of the digital outputs may also be changed to work as alarm output or as remote output device controlled by the Modbus protocol as described in the instrument set up section.

4.4 Optional modules connection

The optional modules shall be placed beside of the instrument and shall be connected to the same by means of the cable supplied with.

The optional modules are self-supplied; the instrument recognises the type of option(s) connected and the applicable programming menu will automatically appear when necessary.



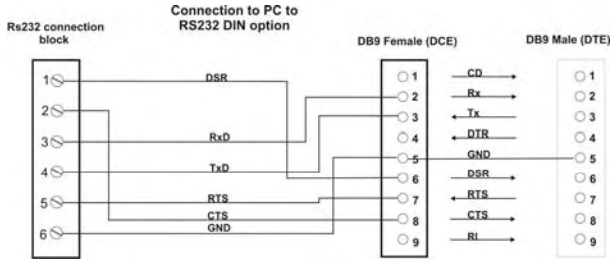
CN1 connector: suitable for the RS485 or RS232 optional modules
CN2 connector: suitable for the 4-20 mA optional module or for the Hardware up-date key

4.4.1 RS485 Option

RS485 pin out	
1	A +
2	B -
3	Shield

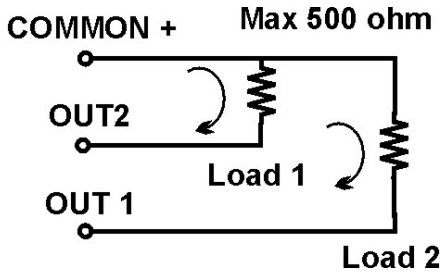
4.4.2 RS232 Option

RS232 pin out	
1	DSR (Handshake to DTE)
2	CTS (Handshake to DTE)
3	RD (Data to DTE)
4	TD (Data from DTE)
5	RTS (Handshake from DTE)
6	GND



4.4.3 Dual 4-20 mA analog output option

4-20 mA pin out	
1	CH1 Channel 1
2	CH2 Channel 2
3	Source Common +

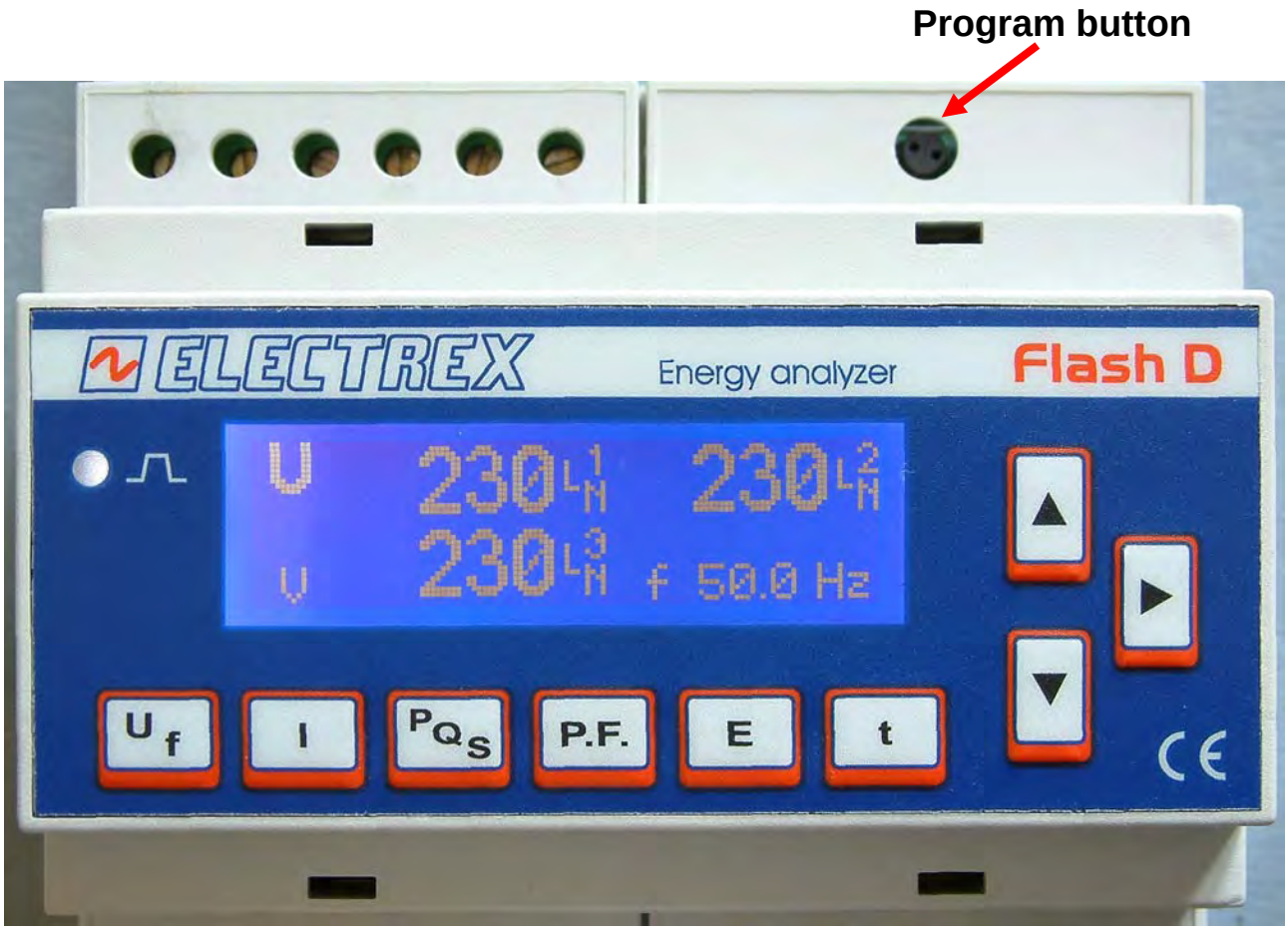


NB. The outputs are self powered; do not use external power supply.

5 Instrument use

5.1 Instrument set up

The set up procedure allows to program the instrument operating parameters.
Entry in the programming procedure is obtained by pressing the PROGRAM button that is located on the upper right side of the instrument.



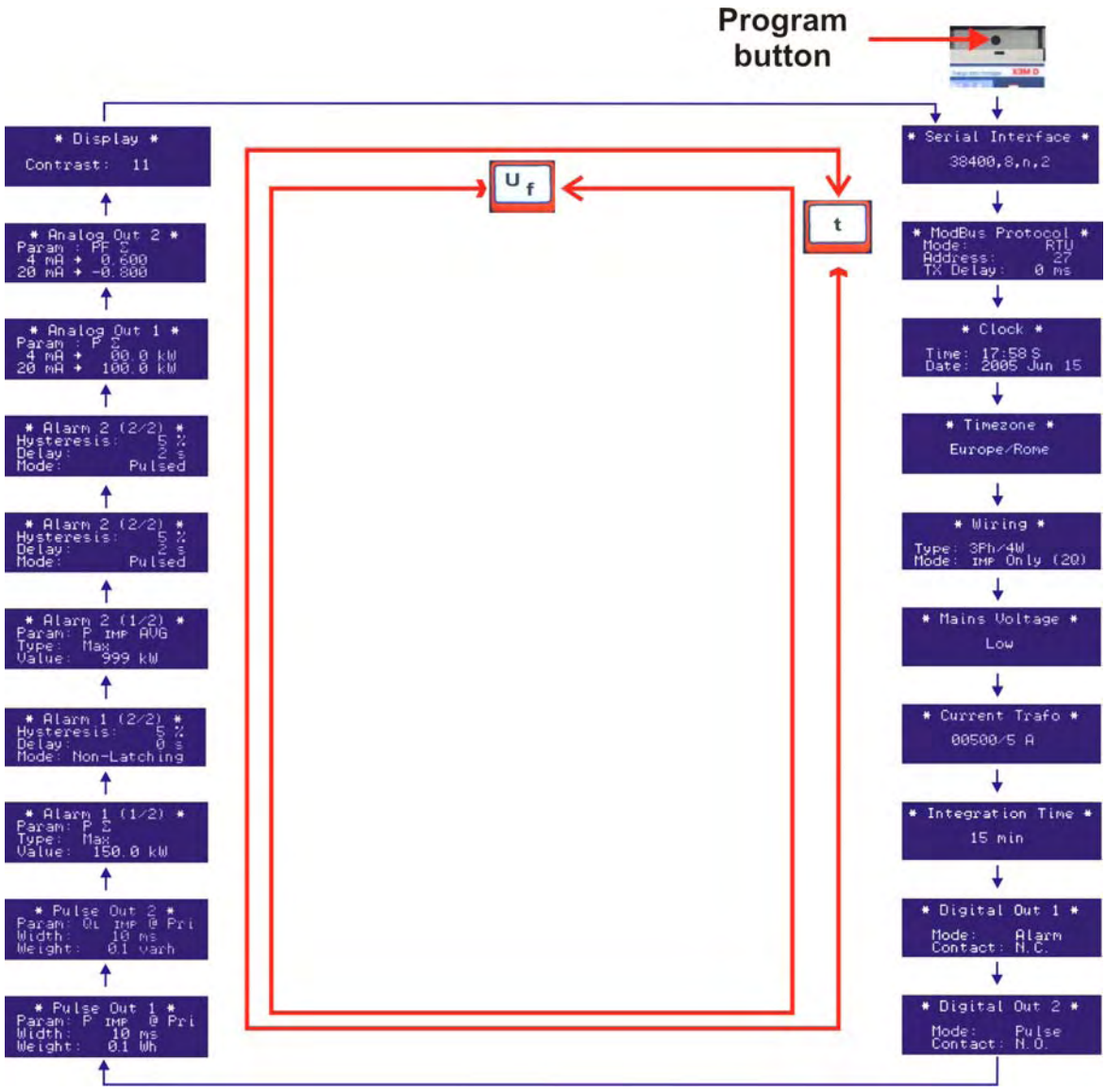
The ▶ key allows to scroll the various entry fields within a set up page as well as to pass to the next page upon scrolling all the fields of one page.

The ▼ and ▲ keys allow the modification of the flashing field being currently selected.
The content of a field can be either numeric or a parameter controlling the device behavior.

The t key advances to the next page, the Uf key returns to the previous page

By pressing the PROGRAM button (while in any configuration page) the menu is exited and the configuration entries so far performed are saved.

5.1.1 Set up sequence



Within the first page of the instrument set up menu, the following functions are available too.

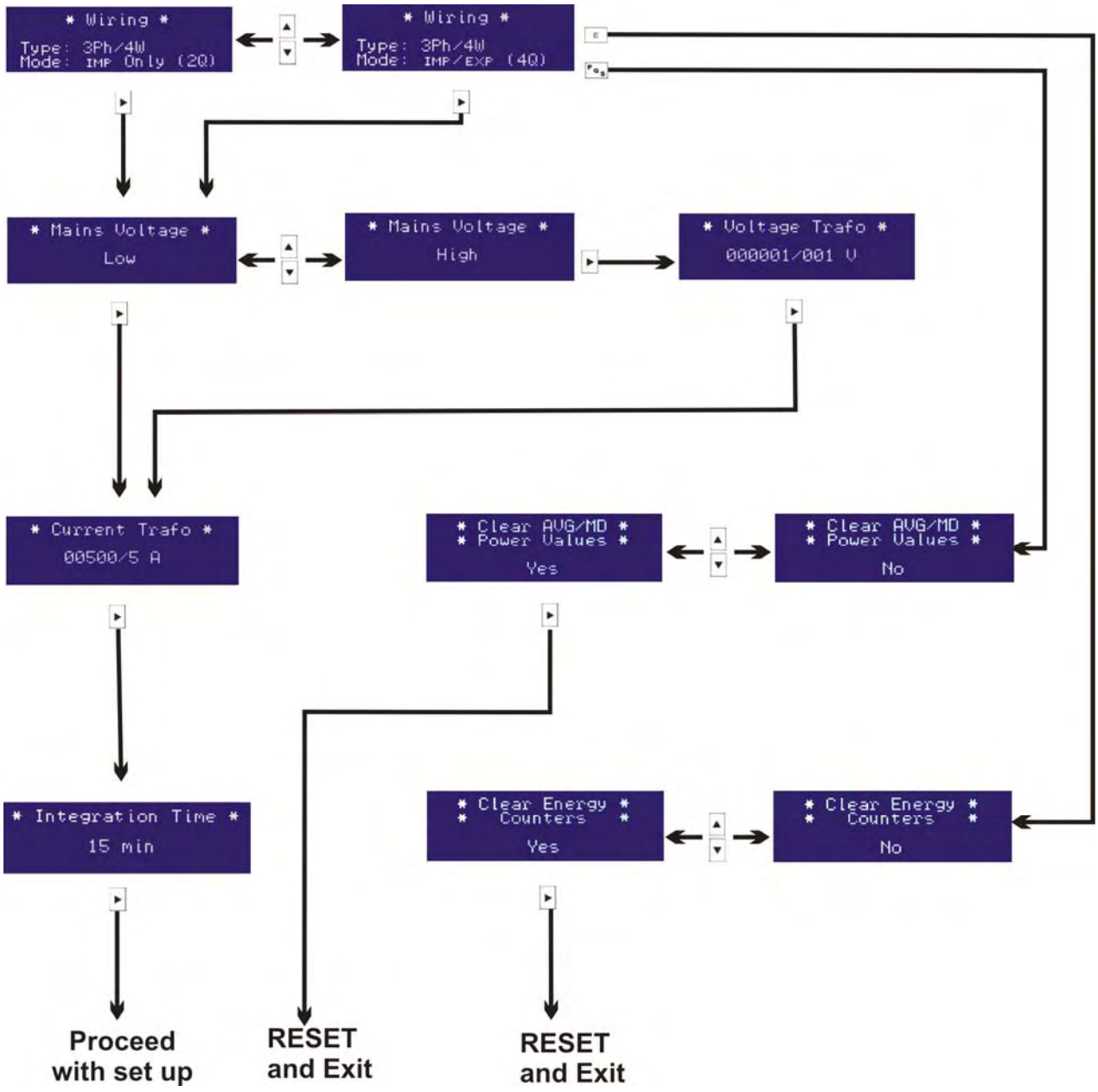
- a pressure of the E key opens the energy counters reset page.

- a pressure of the P Q S key opens the reset page of the average and maximum demand.

Here below the set up page formats and the programming flow diagram

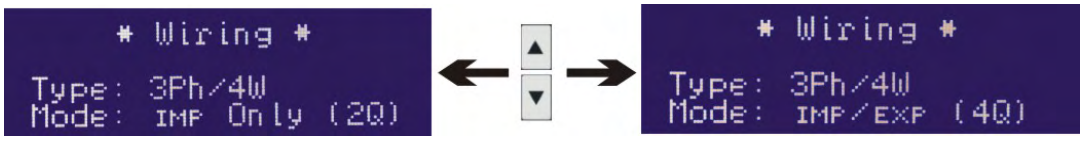
NOTE: all new setting and/or alteration of the instrument programming parameters become effective only upon exit from the programming session by pressing the PROGRAM button located on the upper right side of the instrument.

5.1.2 Configuration procedure



5.1.2.1 Electrical system configuration

The first programming page shows the configuration of the type of electrical system.



The first selection sets the type of electrical system and the type of wiring used:

- 3 phase 4 wire Star system **[3Ph/4W]**
- 3 phase 3 wire Delta system **[3Ph/3W]**,
- balanced 3 phase 4 wire system (1 CT only) **[3Ph-b/4W]**,
- balanced 3 phase 3 wire system **[3Ph-b/3W]**,
- single phase system **[1Ph/2W]**

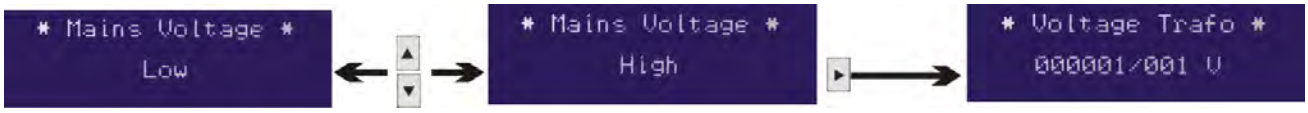
- bi-phase system **[2Ph/2W]**.

The second selection sets whether the operating mode is:

- Import only **[Import (2Q)]**
- Import-Export **[Imp/Exp (4Q)]**.

The instrument is set by default to **[3Ph/4W]** and Import **[Import (2Q)]** mode. This configuration automatically compensates all possible CT output reversal.

The following page enables to set the type of voltage measurement.

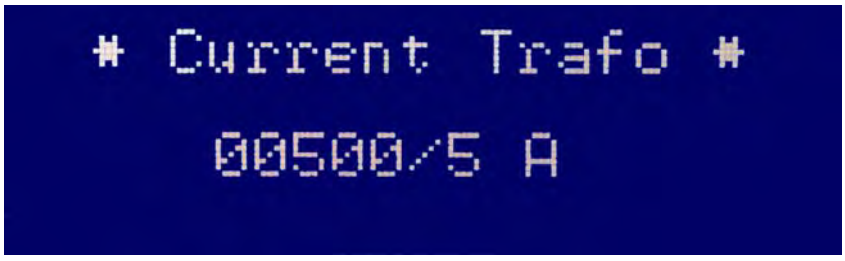


If the voltage measurement is direct in low voltage, select **[Low];** the menu passes directly to the currents setting page.

If the voltage measurement is made on the HT side and/or via a voltage transformer, select **[High]** and proceed to the next page for setting the Volatge transformer (PT) primary and secondary values
Enter the PT rated primary and secondary values indicated on the PT label; the values taken by measurement are unsuitable to this purpose.
The primary and the secondary values must be integers, the ratio can also be fractional.

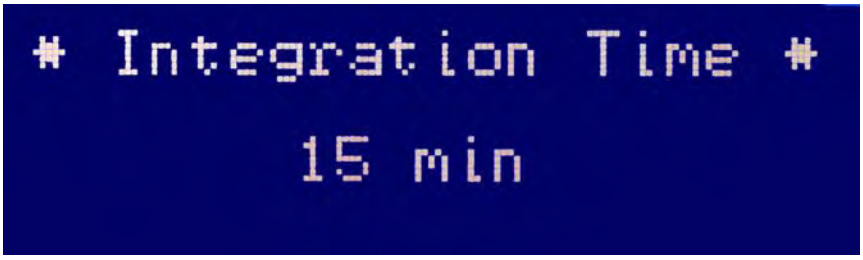
The instrument is set by default to **[Low]**

After the voltage setting, the current set up page is prompted for programming the CT values; it requires the entry of the CT primary rating and the CT secondary rating.



Ensure to enter the CT rated primary and secondary values as indicated on the CT label.
When using 2 or 3 current transformers ensure that all the current transformers have the same ratings.
The instrument is set by default to **[00005/5]**.

The next page allows to set the integration time for calculating the Average and the Maximum Demand.



The value is expressed in minutes in a 1 to 60 min. range.

The instrument supports two average values: one calculated by using the sliding window method and the other one calculated on a fixed time basis. The time setting that is programmed by keyboard is the average demand integration time with the sliding window method. The Maximum Demand too is calculated on the sliding window basis.

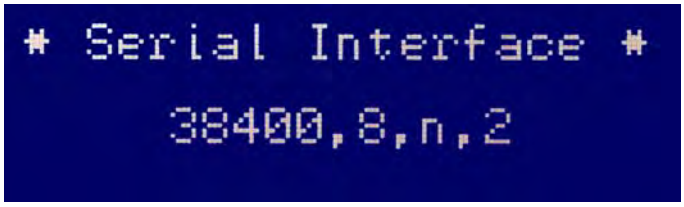
The integration time on a fixed time basis is used for storing the energy data however this setting is available only as a MODBUS register via serial port setting.

5.1.2.2 Communication characteristics configuration

This menu appear only upon connection to the instrument of an RS-485 or an RS-232 optional module.
The setting of the RS485 communication characteristics requires to scroll the programming pages with two keys;

The [t] key advances to the next page, the [U f] key returns to the previous page

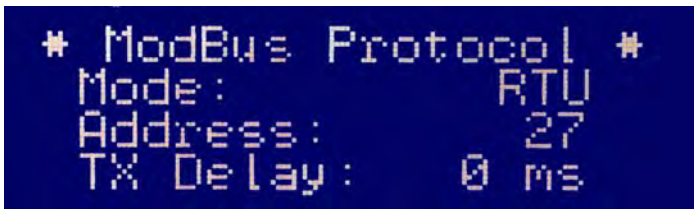
The first page is the following:



This page enables the setting of respectively:
- communication speed
- number of data bits
- parity
- stop bits

All these data are correlated depending upon the stop bit value.

Additional parameters regarding the MODBUS communication protocol may be set in the next page:



and a 0 setting is also possible.

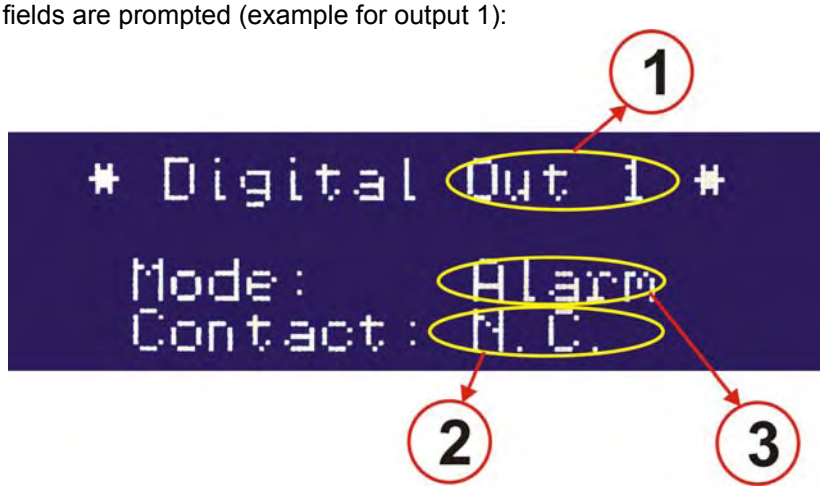
- Mode: it may be configured to RTU or to ASC (ASCII) mode.
- Slave Address
- Transmission delay; it stands for the time delay the instrument will wait prior to reply to a data query. It is expressed in milliseconds, the default value is 100 msec

5.1.2.3 Digital Outputs configuration

The instrument is equipped with 2 digital outputs that are set by default to operate as pulse outputs proportional to P_{Σ} (output 1) and Q_{Σ} (output 2) at a rate of 1.000 pulses per kWh (or kvarh) referred to the instrument range without any CT and PT multiplier.

The operating mode of digital outputs may be changed to operate as alarm output or as remote output device controlled by the Modbus protocol.
When operating on the Modbus protocol, in order to ensure a protection to the outputs in case of communication failure, it is possible to configure a watchdog timer (programmable from 0 to 60 minutes; 0 = disabled).

The following entry fields are prompted (example for output 1):



(1) Digital out number being programmed.
(2) Contact: it configures the rest state of the output transistor.
n.c. normally closed or **n.o.** normally open:

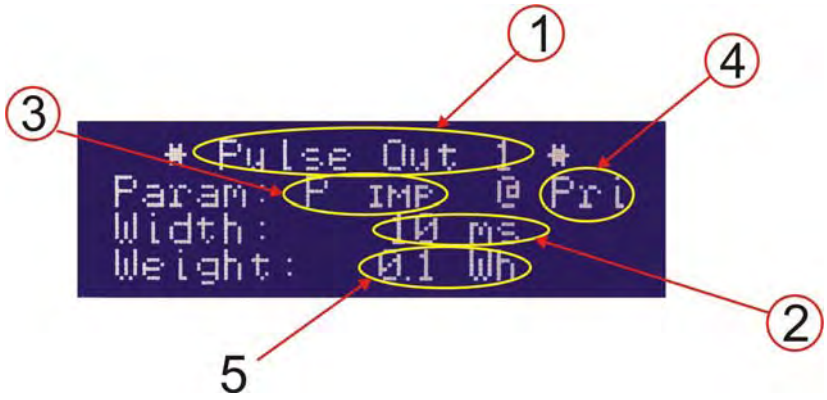
(3) Mode of operation**:**

PULSE (default setting) for operation as pulse output
ALARM for operation as alarm contact output
Remote for operation as remote output device controlled via Modbus

The procedure for programming the digital output 2 is identical.

5.1.2.4 Pulse characteristics configuration

If the PULSE selection is operated, the following page is shown allowing the configuration of the pulse characteristics:



Where:

(1) Pulse output number being programmed.

(2) Pulse duration in mSec; programmable from 50 up to 900 in steps of 10.

(3) Parameter selected for pulse transmission: It may be selected among:

P imp	Import active power
P exp	Export active power
QL imp	Reactive power (inductive) with import active power
Qc imp	Reactive power (capacitive) with import active power
QL exp	Reactive power (inductive) with export active power
Qc exp	Reactive power (capacitive) with export active power
S imp	Apparent power with import active power
S exp	Apparent power with export active power

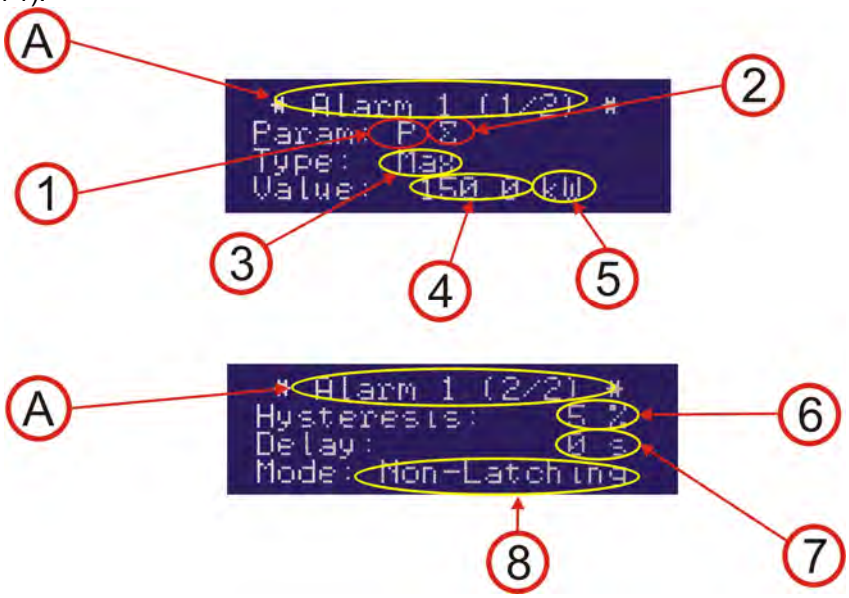
(4) **Pri**: the pulses take into account the CT and PT ratio and are referred to their primary readings
Sec: the pulses are referred to the CT (and PT) secondary reading without any multiplier .

(5) Pulse **weight**: programmable from 0,1 Wh up to 1 MWh through all the intermediate steps.
Example: 1.0 Wh = 1000 pulses/kWh.

5.1.2.5 Alarm configuration

The Instrument is equipped with two alarms that are triggered by a programmable threshold on anyone of the measured parameters.
The types of alarm available are: maximum, minimum and 1-of-3.
A minimum alarm is triggered when the selected parameter is lower than the alarm threshold.
A maximum alarm is triggered when the selected parameter exceeds the alarm threshold.
A 1-of-3 alarm is triggered when anyone of the phase readings, whichever the phase involved, trespasses the alarm threshold – this alarm can be either maximum or minimum. On a 1-of-3 current alarm, the threshold is expressed as percentage (rather than a value) that stands for the unbalance between the phases. The alarm therefore triggers when the percent difference between two of the three phases exceeds the threshold; it is calculated as 100 x $(I_{max} - I_{min})/I_{max}$.
All alarms allow also the setting of an hysteresys and a delay time.
The **hysteresys** (in percent) sets the difference between the triggering threshold and the end threshold (this prevents repeated alarm triggering when the reading oscillates around the trigger value). Example: a 5% hysteresys on a threshold of 100, triggers the alarm when the reading exceeds 100 but it will switch off the alarm when the reading becomes lower than 95.
The **delay time** sets a time delay for triggering on the alarm after its actual occurrence (or triggering off after its actual end).

The set up of each alarm is performed on two programming pages prompting the following entry fields (example for Alarm 1).



(A) Alarm No. and page No. identification (**AL1 =** alarm 1 that may be associated to output 1)

(1) Parameter type applying to Alarm 1. The possible choices are:

None	Disabled
U	Voltage
f	Frequency
I	Current
P	Active Power
Q	Reactive Power
S	Apparent Power
PF	Power Factor
U THD	Total Harmonic Distortion (Voltage)
I THD	Total Harmonic Distortion (Current)

(2) Parameter definition: The possible choices are:

LN	Average star value (applicable to voltage, current and THD only).
LL	Average system value (applicable to voltage and THD only).
N	Neutral value (applicable to current only)
Σ	Three phase value (applicable to active, reactive and apparent power only)

L1	Phase 1 value.
L2	Phase 2 value.
L3	Phase 3 value.
L1-L2	Phase-phase (L1-L2) value (applicable to system voltages and THD only)
L2-L3	Phase-phase (L2-L3) value (applicable to system voltages and THD only)
L3-L1	Phase-phase (L3-L1) value applicable to system voltages and THD only)
1÷3 LL	Value applicable to all the three phase-phase readings of voltage or THD.
1÷ 3 LN	Value applicable to all the three phase-neutral readings of current, voltage or THD.
AVG	Average value (applicable to average powers – demand - only).

(3) Alarm type
M = maximum
m = minimum

(4) Threshold value: programmable in the range –1999 +1999

(5) Decimal point: the parameter value may be scaled to the powers of ten by using the m, K, M symbols and the decimal point. Range is between 10^{-3} a 10^{9}.

(6) Hysteresys: value, from 0% to 99%

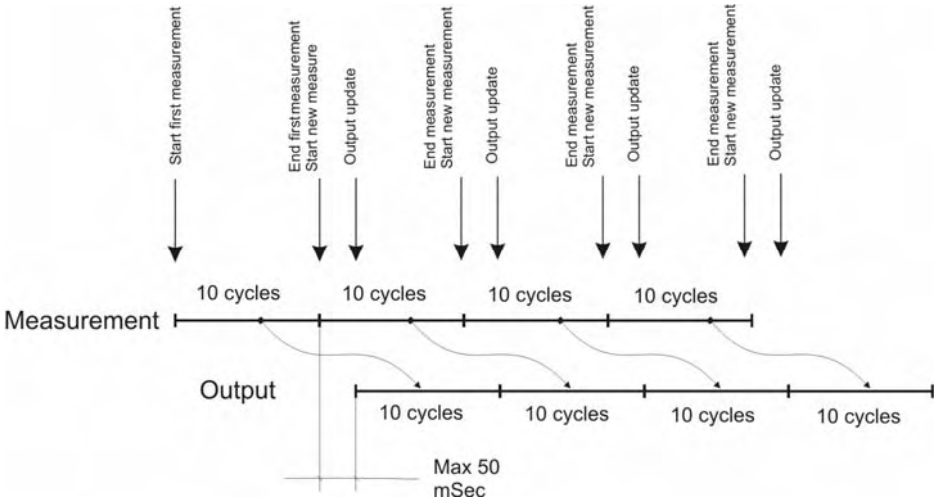
(7) Delay time: from 0 to 99 seconds

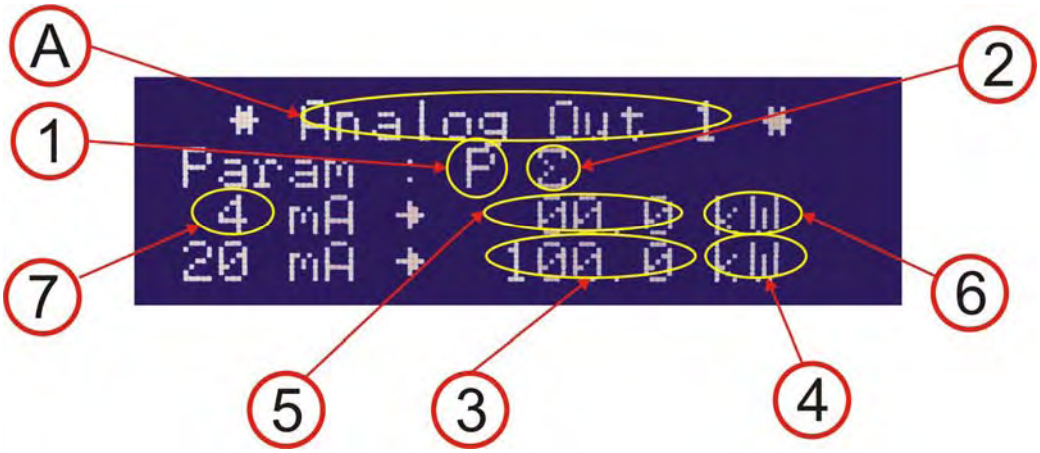
(4) Output trigger mode:
Non-latching = normal (the relay is active for the duration of the alarm),
Pulsed = pulsed (the alarm triggering generates a pulse).

The Alarm 2 programming procedure is identical.

5.1.2.6 4-20 mA Analog Outputs configuration.

The instrument supports two 4-20 mA or 0-20 mA analog outputs with 500 ohms maximum load. Each output is to one of the parameters handled by the instrument.
The output is updated every 10 cycles of the network frequency (i.e. every 200mSec with 50 Hz mains) with a maximum delay of 50 mSec from the actual measurement.





(A) Output identification: **A.o.1** = analog output 1.

(1) Parameter applying. The possible choices are:

None	Disabled
U	Voltage
f	Frequency
I	Current
P	Active Power
Q	Reactive Power
S	Apparent Power
PF	Power Factor
U THD	Total Harmonic Distortion (voltage)
I THD	Total Harmonic Distortion (current)

(2) Parameter definition: The possible choices are:

LN	Average star value (applicable to voltage, current and THD only).
LL	Average system value (applicable to voltage and THD only).
N	Neutral value (applicable to current only)
Σ	Three phase value (applicable to active, reactive and apparent power only)
L1	Phase 1 value.
L2	Phase 2 value.
L3	Phase 3 value.

L1-L2	Phase-phase (L1-L2) value (applicable to system voltages and THD only)
L2-L3	Phase-phase (L2-L3) value (applicable to system voltages and THD only)
L3-L1	Phase-phase (L3-L1) value applicable to system voltages and THD only)
AVG	Average value (applicable to average powers - demand - only).

(3) Value to be associated to the 20 mA full scale signal; programmable in the range –1999 +1999

(4) Scale; the parameter value may be scaled to the powers of ten by using the m, K, M symbols and the decimal point. Range is between 10^{-3} a 10^{9}.

(5) Value to be associated to the 4 mA (or 0 mA) signal; programmable in the range –1999 +1999.

(6) Scale; the parameter value may be scaled to the powers of ten by using the m, K, M symbols and the decimal point. Range is between 10^{-3} a 10^{9}.

(7) Output type: 4-20 mA or 0-20 mA.

The procedure for programming of the Analogue output 2 is identical.

5.1.2.6.1 Alarms and 4-20 mA output configuration for the average (AVG) parameters

In the Import-Export operating mode, the instrument supports a 4 quadrant measurement, but the selection can be made on one quadrant at a time.

When operating an AVG average selection, the following parameters are prompted.

P IMP AVG	Import active power
P EXP AVG	Export active power (exiting)
QL IMP AVG	Reactive power (inductive) with import active power.
QC IMP AVG	Reactive power (capacitive) with import active power
QL EXP AVG	Reactive power (inductive) with export active power
QC EXP AVG	Reactive power (capacitive) with export active power
S IMP AVG	Apparent power with import active power
S EXP AVG	Apparent power with export active power

5.1.2.7 Clock calendar configuration (for X3M-D only)

The X3M-D is equipped with a clock/calendar with internal battery having a 20 years life time.
The clock/calendar supports the time zone handling functions and the automatic change from Standard Time to Daylight Saving Time and vice versa.
The instrument is set by default to the Europe/Rome time and time zone.
The clock/calendar setting is covered by the last two SETUP pages.

Clock format
The following Time formats are foreseen:

Coordinated Universal Time (UTC): commonly known as GMT (Greenwich Mean Time): it is the universal time, applicable to any place on earth.

Standard Time: it is the local time of a specific time zone, based on the sun cycles (known as Solar Time

Daylight Saving Time it is the local time of a specific time zone when an offset on standard time is applied (DST offset). The introduction of this offset allows to increase the availability of hours with natural light in the summer evenings.

Wall time: it is how we refer to the clock time in each time zone. The Wall time actually coincides with the Daylight Saving Time or the Standard Time depending whether an offset Solar time is occurring or not.

The difference between Standard Time and UTC time is called GMT offset.
Summarizing:
GMT offset = UTC – Standard Time
Wall Time = Standard Time + DST offset = UTC + GMT offset + DST offset

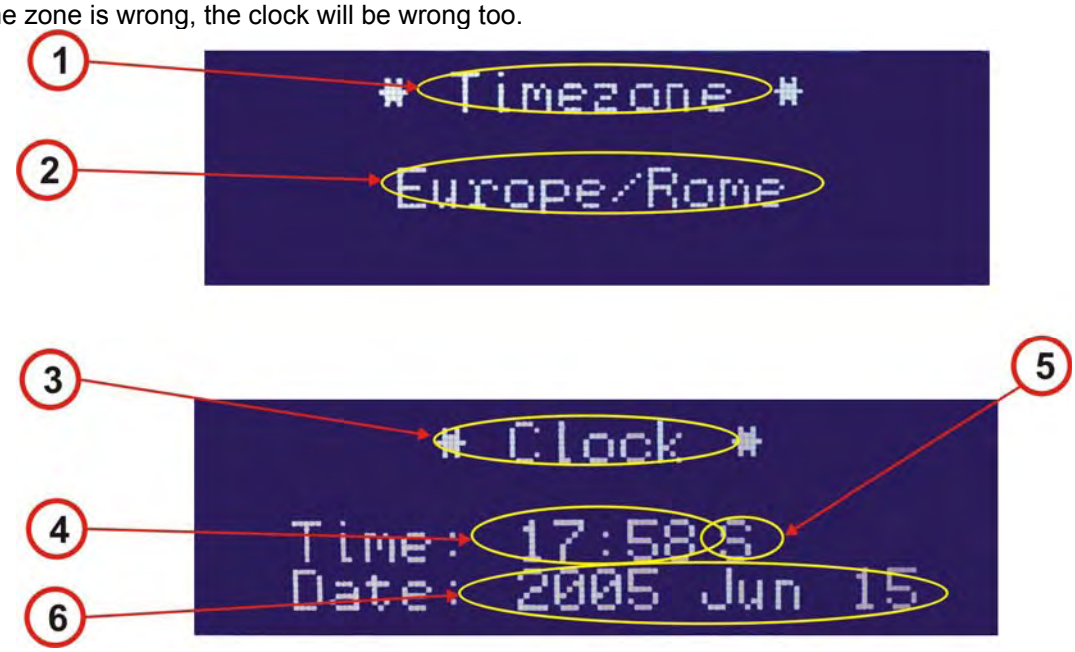
The instrument RTC supports the following time information:

- UTC Date/time
- Time zone identification

Starting from the UTC time, the instrument automatically calculates the local time (Wall Time) of any place on earth
The pertinent time zone is entered to the instrument by a numeric index (time zone index) either on the set up procedure or on a MODBUS register.

NOTE: The instrument clock operates in UTC, therefore a correct time zone attribution is essential. Check whether the time zone entry is correct before modifying the clock. Otherwise a wrong time setting could be involuntarily programmed

The clock is updated by using the local time or “wall time” that the instrument converts in UTC, consequently, if the time zone is wrong, the clock will be wrong too.



(1) **Time zone** = Time zone set up page.

(2) Time zone index. The default setting is 334 = Europe/Rome that is valid all over central Europe. See the enclosed tables for identification of the pertinent time zone.

(3) **Clock:** calendar clock set up page.

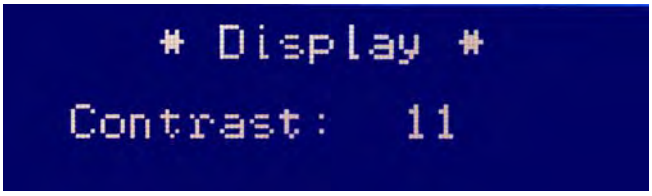
(4) Time setting in hours and minutes. Upon entry into the page the **--:--** field is displayed.
By leaving the field to the **--:--** vaue, the time will not be modified.
All time modification influences the data storage thus manual time alterations should be operated only when strictly necessary; otherwise the clock updates should preferably be handled by the external management software.
Press the ▼ and ▲ keys to display and modify the current time and date, the hours first, then the minutes. The new time entry will occur only upon exiting the programming mode.
Should an involuntary modification be edited, in order to avoid a clock change, it is necessary to set the time field back to **--:--**. This choice is found after the last valid hour or minute (i.e. beyond 23 hours / 0 m).

(5) Day light saving time indicator: **12:30** stands for winter time while **12:30 S** stands for daylight saving or summer time.

(6) Calendar setting: expressed in the Year, Month, Day format; example: **2005 May 25**.
Should an involuntary modification be edited, in order to avoid a calendar change, it is necessary to set the calendar field back to the **---- ---** selection.

5.1.2.8 Contrast adjustment

The ▲ and ▼ keys allow to adjust the display contract to the viewing angle in a 1 to 15 range.



The display illumination is automatically reduced 3 minutes after the last key pressure .
It will automatically becomes brighter whenever pressing a key again.

5.1.2.8.1 Time zones

The pertinent time zone is entered to the instrument by a numeric index (*time zone index*).
The time zone index and the standard time zone names are shown in the charts below:

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
Africa/Abidjan	0
Africa/Accra	1
Africa/Addis_Ababa	2
Africa/Algiers	3
Africa/Asmera	4
Africa/Bamako	5
Africa/Bangui	6
Africa/Banjul	7
Africa/Bissau	8
Africa/Blantyre	9
Africa/Brazzaville	10
Africa/Bujumbura	11
Africa/Cairo	12
Africa/Casablanca	13
Africa/Ceuta	14
Africa/Conakry	15
Africa/Dakar	16
Africa/Dar_es_Salaam	17
Africa/Djibouti	18
Africa/Douala	19
Africa/El_Aaiun	20
Africa/Freetown	21
Africa/Gaborone	22
Africa/Harare	23
Africa/Johannesburg	24
Africa/Kampala	25
Africa/Khartoum	26
Africa/Kigali	27
Africa/Kinshasa	28
Africa/Lagos	29
Africa/Libreville	30
Africa/Lome	31
Africa/Luanda	32
Africa/Lubumbashi	33
Africa/Lusaka	34
Africa/Malabo	35
Africa/Maputo	36
Africa/Maseru	37
Africa/Mbabane	38
Africa/Mogadishu	39
Africa/Monrovia	40
Africa/Nairobi	41
Africa/Ndjamena	42
Africa/Niamey	43
Africa/Nouakchott	44
Africa/Ouagadougou	45
Africa/Porto-Novo	46
Africa/Sao_Tome	47
Africa/Timbuktu	48

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
Africa/Tripoli	49
Africa/Tunis	50
Africa/Windhoek	51
America/Adak	52
America/Anchorage	53
America/Anguilla	54
America/Antigua	55
America/Araguaina	56
America/Argentina/Buenos_Aires	66
America/Argentina/Catamarca	71
America/Argentina/ComodRivadavia	400
America/Argentina/Cordoba	76
America/Argentina/Jujuy	109
America/Argentina/La_Rioja	401
America/Argentina/Mendoza	121
America/Argentina/Rio_Gallegos	402
America/Argentina/San_Juan	403
America/Argentina/Tucuman	404
America/Argentina/Ushuaia	405
America/Aruba	57
America/Asuncion	58
America/Bahia	59
America/Barbados	60
America/Belem	61
America/Belize	62
America/Boa_Vista	63
America/Bogota	64
America/Boise	65
America/Cambridge_Bay	67
America/Campo_Grande	68
America/Cancun	69
America/Caracas	70
America/Cayenne	72
America/Cayman	73
America/Chicago	74
America/Chihuahua	75
America/Costa_Rica	77
America/Cuiaba	78
America/Curacao	79
America/Danmarkshavn	80
America/Dawson	81
America/Dawson_Creek	82
America/Denver	83
America/Detroit	84
America/Dominica	85
America/Edmonton	86
America/Eirunepe	87
America/El_Salvador	88
America/Fortaleza	89

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
America/Glace_Bay	90
America/Godthab	91
America/Goose_Bay	92
America/Grand_Turk	93
America/Grenada	94
America/Guadeloupe	95
America/Guatemala	96
America/Guayaquil	97
America/Guyana	98
America/Halifax	99
America/Havana	100
America/Hermosillo	101
America/Indiana/Knox	102
America/Indiana/Marengo	103
America/Indiana/Vevay	104
America/Indianapolis	105
America/Inuvik	106
America/Iqaluit	107
America/Jamaica	108
America/Juneau	110
America/Kentucky/Monticello	111
America/La_Paz	112
America/Lima	113
America/Los_Angeles	114
America/Louisville	115
America/Maceio	116
America/Managua	117
America/Manaus	118
America/Martinique	119
America/Mazatlan	120
America/Menominee	122
America/Merida	123
America/Mexico_City	124
America/Miquelon	125
America/Monterrey	126
America/Montevideo	127
America/Montreal	128
America/Montserrat	129
America/Nassau	130
America/New_York	131
America/Nipigon	132
America/Nome	133
America/Noronha	134
America/North_Dakota/Center	135
America/Panama	136
America/Pangnirtung	137
America/Paramaribo	138
America/Phoenix	139
America/Port_of_Spain	141
America/Port-au-Prince	140
America/Porto_Velho	142
America/Puerto_Rico	143
America/Rainy_River	144

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
America/Rankin_Inlet	145
America/Recife	146
America/Regina	147
America/Rio_Branco	148
America/Santiago	149
America/Santo_Domingo	150
America/Sao_Paulo	151
America/Scoresbysund	152
America/St_Johns	153
America/St_Kitts	154
America/St_Lucia	155
America/St_Thomas	156
America/St_Vincent	157
America/Swift_Current	158
America/Tegucigalpa	159
America/Thule	160
America/Thunder_Bay	161
America/Tijuana	162
America/Toronto	163
America/Tortola	164
America/Vancouver	165
America/Whitehorse	166
America/Winnipeg	167
America/Yakutat	168
America/Yellowknife	169
Antarctica/Casey	170
Antarctica/Davis	171
Antarctica/DumontDUrville	172
Antarctica/Mawson	173
Antarctica/McMurdo	174
Antarctica/Palmer	175
Antarctica/Rothera	176
Antarctica/Syowa	177
Antarctica/Vostok	178
Asia/Aden	179
Asia/Almaty	180
Asia/Amman	181
Asia/Anadyr	182
Asia/Aqtau	183
Asia/Aqtobe	184
Asia/Ashgabat	185
Asia/Baghdad	186
Asia/Bahrain	187
Asia/Baku	188
Asia/Bangkok	189
Asia/Beirut	190
Asia/Bishkek	191
Asia/Brunei	192
Asia/Calcutta	193
Asia/Choibalsan	194
Asia/Chongqing	195
Asia/Colombo	196
Asia/Damascus	197

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
Asia/Dhaka	198
Asia/Dili	199
Asia/Dubai	200
Asia/Dushanbe	201
Asia/Gaza	202
Asia/Harbin	203
Asia/Hong_Kong	204
Asia/Hovd	205
Asia/Irkutsk	206
Asia/Jakarta	207
Asia/Jayapura	208
Asia/Jerusalem	209
Asia/Kabul	210
Asia/Kamchatka	211
Asia/Karachi	212
Asia/Kashgar	213
Asia/Katmandu	214
Asia/Krasnoyarsk	215
Asia/Kuala_Lumpur	216
Asia/Kuching	217
Asia/Kuwait	218
Asia/Macau	219
Asia/Magadan	220
Asia/Makassar	221
Asia/Manila	222
Asia/Muscat	223
Asia/Nicosia	224
Asia/Novosibirsk	225
Asia/Omsk	226
Asia/Oral	227
Asia/Phnom_Penh	228
Asia/Pontianak	229
Asia/Pyongyang	230
Asia/Qatar	231
Asia/Qyzylorda	232
Asia/Rangoon	233
Asia/Riyadh	234
Asia/Saigon	235
Asia/Sakhalin	236
Asia/Samarkand	237
Asia/Seoul	238
Asia/Shanghai	239
Asia/Singapore	240
Asia/Taipei	241
Asia/Tashkent	242
Asia/Tbilisi	243
Asia/Tehran	244
Asia/Thimphu	245
Asia/Tokyo	246
Asia/Ulaanbaatar	247
Asia/Urumqi	248
Asia/Vientiane	249
Asia/Vladivostok	250

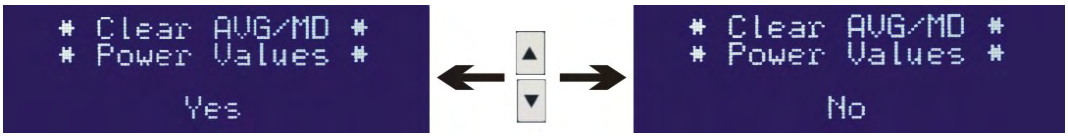
Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
Asia/Yakutsk	251
Asia/Yekaterinburg	252
Asia/Yerevan	253
Atlantic/Azores	254
Atlantic/Bermuda	255
Atlantic/Canary	256
Atlantic/Cape_Verde	257
Atlantic/Faeroe	258
Atlantic/Madeira	259
Atlantic/Reykjavik	260
Atlantic/South_Georgia	261
Atlantic/St_Helena	262
Atlantic/Stanley	263
Australia/Adelaide	264
Australia/Brisbane	265
Australia/Broken_Hill	266
Australia/Darwin	267
Australia/Hobart	268
Australia/Lindeman	269
Australia/Lord_Howe	270
Australia/Melbourne	271
Australia/Perth	272
Australia/Sydney	273
CET	274
EET	275
Etc/GMT	276
Etc/GMT+1	277
Etc/GMT+10	278
Etc/GMT+11	279
Etc/GMT+12	280
Etc/GMT+2	281
Etc/GMT+3	282
Etc/GMT+4	283
Etc/GMT+5	284
Etc/GMT+6	285
Etc/GMT+7	286
Etc/GMT+8	287
Etc/GMT+9	288
Etc/GMT-1	289
Etc/GMT-10	290
Etc/GMT-11	291
Etc/GMT-12	292
Etc/GMT-13	293
Etc/GMT-14	294
Etc/GMT-2	295
Etc/GMT-3	296
Etc/GMT-4	297
Etc/GMT-5	298
Etc/GMT-6	299
Etc/GMT-7	300
Etc/GMT-8	301
Etc/GMT-9	302
Etc/UCT	303

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
Etc/UTC	304
Europe/Amsterdam	305
Europe/Andorra	306
Europe/Athens	307
Europe/Belfast	308
Europe/Belgrade	309
Europe/Berlin	310
Europe/Brussels	311
Europe/Bucharest	312
Europe/Budapest	313
Europe/Chisinau	314
Europe/Copenhagen	315
Europe/Dublin	316
Europe/Gibraltar	317
Europe/Helsinki	318
Europe/Istanbul	319
Europe/Kaliningrad	320
Europe/Kiev	321
Europe/Lisbon	322
Europe/London	323
Europe/Luxembourg	324
Europe/Madrid	325
Europe/Malta	326
Europe/Minsk	327
Europe/Monaco	328
Europe/Moscow	329
Europe/Oslo	330
Europe/Paris	331
Europe/Prague	332
Europe/Riga	333
Europe/Rome	334
Europe/Samara	335
Europe/Simferopol	336
Europe/Sofia	337
Europe/Stockholm	338
Europe/Tallinn	339
Europe/Tirane	340
Europe/Uzhgorod	341
Europe/Vaduz	342
Europe/Vienna	343
Europe/Vilnius	344
Europe/Warsaw	345
Europe/Zaporozhye	346
Europe/Zurich	347
Indian/Antananarivo	348
Indian/Chagos	349
Indian/Christmas	350
Indian/Cocos	351
Indian/Comoro	352
Indian/Kerguelen	353
Indian/Mahe	354
Indian/Maldives	355
Indian/Mauritius	356

Standard Timezone Name (FW > 1.06)	X3M-D Timezone Index
Indian/Mayotte	357
Indian/Reunion	358
MET	359
Pacific/Apia	360
Pacific/Auckland	361
Pacific/Chatham	362
Pacific/Easter	363
Pacific/Efate	364
Pacific/Enderbury	365
Pacific/Fakaofo	366
Pacific/Fiji	367
Pacific/Funafuti	368
Pacific/Galapagos	369
Pacific/Gambier	370
Pacific/Guadalcanal	371
Pacific/Guam	372
Pacific/Honolulu	373
Pacific/Johnston	374
Pacific/Kiritimati	375
Pacific/Kosrae	376
Pacific/Kwajalein	377
Pacific/Majuro	378
Pacific/Marquesas	379
Pacific/Midway	380
Pacific/Nauru	381
Pacific/Niue	382
Pacific/Norfolk	383
Pacific/Noumea	384
Pacific/Pago_Pago	385
Pacific/Palau	386
Pacific/Pitcairn	387
Pacific/Ponape	388
Pacific/Port_Moresby	389
Pacific/Rarotonga	390
Pacific/Saipan	391
Pacific/Tahiti	392
Pacific/Tarawa	393
Pacific/Tongatapu	394
Pacific/Truk	395
Pacific/Wake	396
Pacific/Wallis	397
Pacific/Yap	398
WET	399

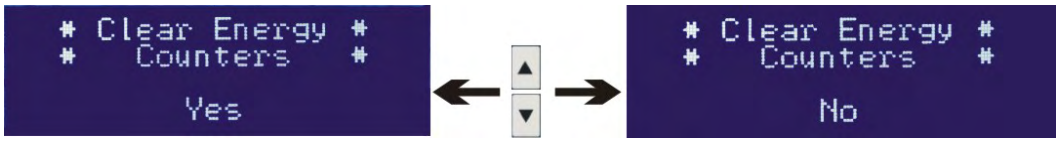
The X3M-D features a built-in database including all the information (*time zone rules*) which allow to calculate the GMT and DST offsets at any time in each time zones listed in the charts. By knowing the GMT and the DST offset, the instrument is able to convert from universal time to local time and vice versa. The database with the time zone data is compiled from the pack distributed by *elsie.nci.nih.gov* (*tzdataXXXXX.tar.gz*) and it is integrated in the instrument firmware. Database updates are therefore possible only by installing a new version of firmware.

5.1.3 Reset Procedure



In order to reset the Average Powers, the Maximum Demand and the Energy counters it is necessary to:

- Enter into the programming menu by pressing the PROGRAM button.
- Press the PQS key to display the powers reset page or the E key to display the energy counters reset page.
- Select YES to reset, NO to skip. Resetting is confirmed by pressing the ▶ key that executes the reset and returns automatically to the readings pages.
- The reset operation clears all the average powers and the Maximum Demand.



It is also possible to exit the procedure, at any time without resetting, by pressing the PROGRAM button.

5.2 Readings

5.2.1 Readings selection keys

The selection of the readings and of the reading pages is made by means of the following keys:

U f	Voltage and frequency key
I	Currents key
P Q S	Powers key
P.F.	Power factor key
E	Energies key
t	Life time indicator key
▲ ▼	Move the selection up and down in the readings pages
▶	This key is disabled in the readings pages.

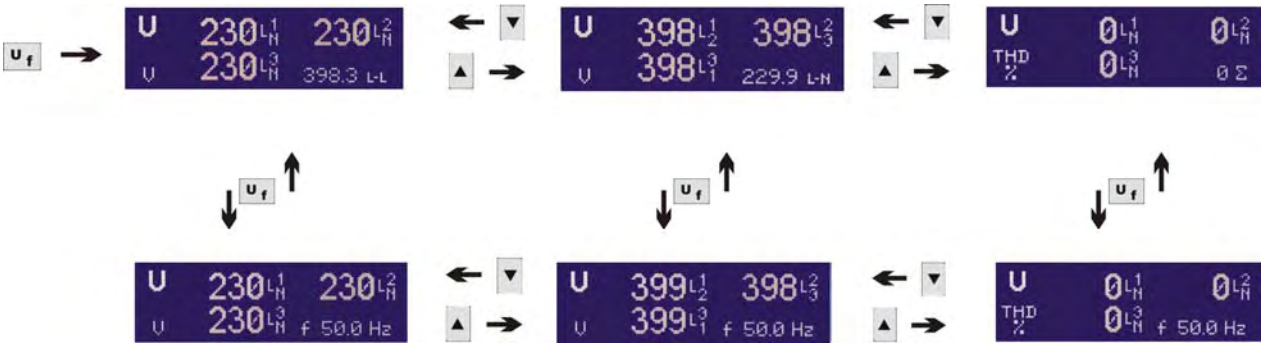
5.2.1.1 Voltage and Frequency readings

By pressing once the U f key, a first voltage readings page is prompted showing the phase-neutral voltages and, on the bottom right side of the display, the average 3-phase system voltage.

By pressing the ▲ key, a second voltage readings page is prompted showing the phase-phase voltages and, on the bottom right side of the display, the average phase-neutral system voltage.

Another pressure of the ▲ key prompts the total harmonic distortion readings of the voltage of each phase.

By pressing again the U f key the frequency is shown on the lower right side on thedisplay.



5.2.1.2 Current readings

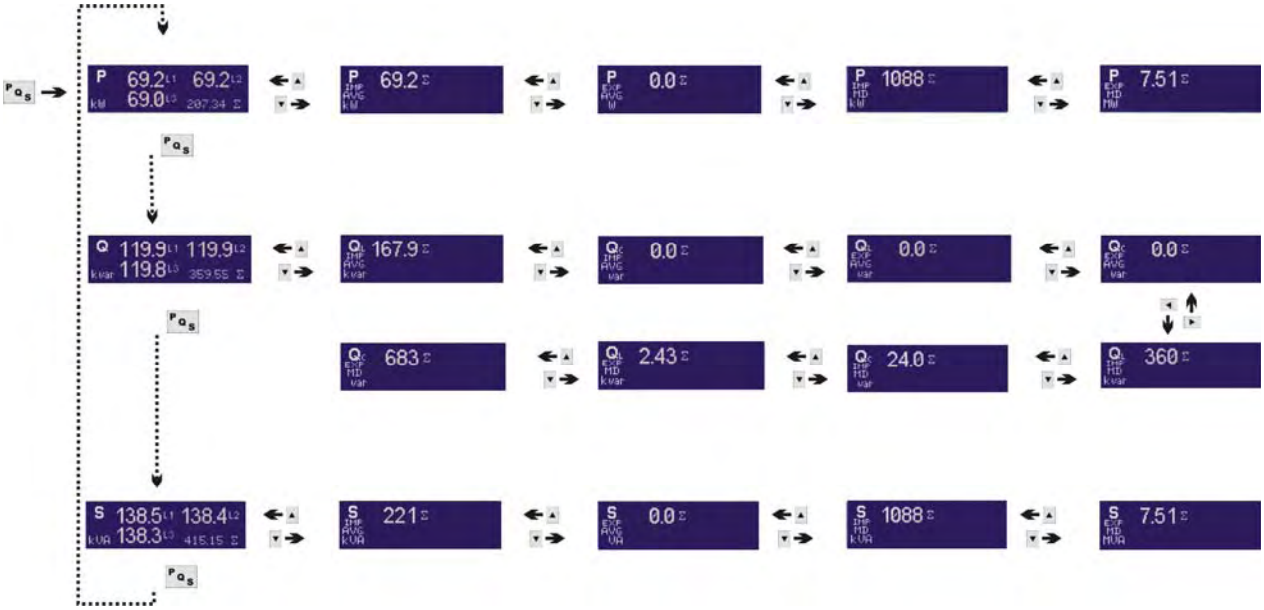
By pressing the I key, the current readings page is prompted showing the currents of each phase as well as the neutral current.

A pressure of the ▲ key prompts the total harmonic distortion readings of the current of each phase.

5.2.1.3 Powers

By pressing the P Q S key the power reading pages for P Active power, Q Reactive power and S Apparent power are scrolled in sequence.

By pressing the ▲ and ▼ keys the average and the maximum powers (Demand and Maximum Demand readings) are displayed.



The displayed parameters are :

P	Active power of each phase and three phase
P IMP AVG	Import average active power
P EXP AVG	Export average active power
P IMP MD	Max Demand on import active power
P EXP MD	Max Demand on export active power
Q	Reactive power of each phase and three phase
QL IMP AVG	Average reactive (inductive) power with import active power
QC IMP AVG	Average reactive (capacitive) power with import active power
QL EXP AVG	Average reactive (inductive) power with export active power
Qc EXP AVG	Average reactive (capacitive) power with export active power
QL IMP MD	Max Demand on reactive (inductive) power with import active power
QC IMP MD	Max Demand on reactive (capacitive) power with import active power
QL EXP MD	Max Demand on reactive (inductive) power with export active power
QC EXP MD	Max Demand on reactive (capacitive) power with export active power
S	Apparent power of each phase and three phase
S IMP AVG	Average apparent power with import active power
S EXP AVG	Average apparent power with export active power
S IMP MD	Max Demand on apparent power with import active power

S EXP MD Max Demand on apparent power with export active power

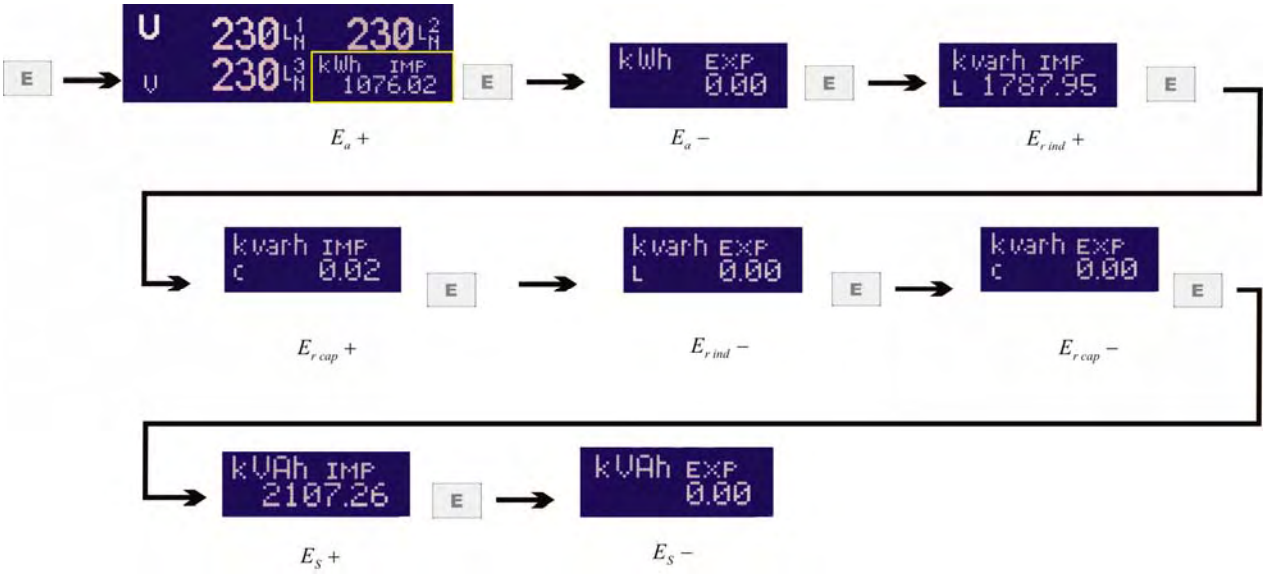
5.2.1.4 Power Factor

By pressing the P.F. key, the power factor readings page is prompted showing the PF of each phase as well as the 3-phase reading. Only one page is displayed.

The – sign ahead of the value identifies a capacitive (leading) reading.

5.2.1.5 Energies

By pressing repeatedly the E key, the several energy readings will be displayed consecutively on the lower right part of the screen.
The energy readings may be recalled at any time irrespective the readings page being displayed.
The energy readings will however disappear upon selection of another readings page but they may be recalled, at any time, by pressing the E key.



Where:

(E_a^+) Import active energy

(E_a^-) Export active energy

($E_{r\,ind}^+$) Reactive energy (inductive) with import active power

($E_{r\,cap}^+$) Reactive energy (capacitive) with import active power

($E_{r\,ind}^-$) Reactive energy (inductive) with export active power

($E_{r\,cap}^-$) Reactive energy (capacitive) with export active power

(E_s^+) Apparent energy with import active power

(E_s^-) Apparent energy with import active power

The quadrant identification is made according to the following trigonometric rule:

5.2.1.6 Tariff Energies and Tariff Maximum Demand (for X3M-D only)

By pressing the P Q S key for 2 seconds from any page, it is possible to display the Energy counters and the Max Demand of each tariff.

The top left symbol identifies the parameter being displayed and the Maximum Demand reading is shown next to it.
The tariff number is indicated on the top right while the energy reading is indicated below.

All the energy and MD readings applicable to the 8 parameters of a 4 quadrant measurement are foreseen.

Press shortly the P Q S key to scroll the different parameters.

Press the ▼ and ▲ keys to scroll the different tariffs.

To move back to the traditional reading mode, press the P Q S key again for 2 seconds.

NB
In the case the instrument is not loaded with a proper calendar file or in the case some tariffs are not included in the calendar, dashes will be displayed in place of the readings.

5.2.1.7 Calendar Clock (for X3M-D only) and Life Time

By pressing the t key the instrument calendar clock (for X3M-D only) and the life time reading are displayed.

The life time is the instrument operating time (when powered on) since it was manufactured.
The readings is expressed in hours and hour hundredths; it can reach 99.999 hours equal to 11 years.
The life time reading reset is not possible.

A broader instructions manual including the Modbus protocol mapping may be downloaded from our web page www.electrex.it.

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Edition 5 dated June 20th 2005
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